# A GUIDE FOR PREPARATION OF RADIOACTIVE MATERIALS LICENSE APPLICATIONS FOR THE USE OF SEALED SOURCES IN PORTABLE AND SEMIPORTABLE GAUGING DEVICES

Kansas Department of Health and Environment
Bureau of Air and Radiation
Radiation Control Program
Forbes Field, Bldg. 283
Topeka, Kansas 66620

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TABLE OF CONTENTS

## I. INTRODUCTION

This guide describes the type of information needed to evaluate an application for a specific license for receipt, possession, use, and transfer of radioactive material contained in portable and semiportable gauging devices such as moisture-density gauges and X-ray fluorescence analyzers. The Department's regulations, listed below, apply to radioactive material licenses and should be used in conjunction with this guide. The applicant should carefully read the regulations. This guide does not substitute for an understanding of the regulations.

1. KRPR's Part 1, "General."

2. KRPR's Part 3, "Licensing of Sources of Radiation."

3. KRPR's Part 4, "Standards for Protection Against Radiation."

4. KRPR's Part 10, "Notice, Instructions and Reports to Workers, Inspections."

## II AS LOW AS REASONABLY ACHIEVABLE

The applicant should, in addition to complying with the requirements set forth in the Kansas Radiation Protection Regulations, make every reasonable effort to maintain radiation exposures, and radioactive material effluents to unrestricted areas, As Low As Reasonably Achievable (ALARA). Applicants should give consideration to the ALARA philosophy in the development of operating procedures and in the training of personnel using radioactive material.

Some of the items that should be considered to help maintain radiation exposures as low as reasonably achievable are discussed below. The discussion is not intended to be all inclusive, but should be used as a guide in establishing an operating philosophy for maintaining occupational radiation exposures as low as reasonably achievable.

The most important single item is the routine use of survey meters to ensure that radioactive sources have been returned to the storage container after each log operation. The necessity of performing adequate surveys should be emphasized during initial classroom training, on-the-job training, and refresher training of personnel.

The habit of taking advantage of available shielding at temporary job sites also contributes to maintaining low occupational exposures. Again, this practice can and should be addressed during initial training, on-the-job training, and refresher training.

In addition to the practices mentioned above, taking advantage of the full length of the handling devices, using as long a handling tool as practicable and properly storing radioactive material as soon as possible after use can all contribute to maintaining occupational exposures as low as reasonable achievable.

In addition to providing for items as those listed above, the necessity of using the safety equipment that is provided should be emphasized during initial training of radiation workers.

Management can also contribute to maintaining low occupational exposures by spreading the workload among personnel so that the same person does not always receive the assignment that involves the highest exposure. Management should review personnel monitoring records to identify those individuals who have exposures higher than the average and to try to establish and correct the cause.

## III. FILING AN APPLICATION

The information submitted must be sufficient to allow the Department to determine that the proposed equipment, facilities, procedures, and controls are adequate to protect health and minimize danger to life and property. Information submitted should pertain to the specific activities for which authorization is sought and should be complete. Submission of incomplete information will result in delays because of the correspondence necessary to obtain supplemental information.
Applications should be mailed to:

Kansas Department of Health and Environment
Bureau of Air and Radiation
Radiation Control Program
Forbes Field, Bldg. 283
Topeka, KS 66620

State licensees are required to comply with Department rules and regulations, license conditions, and the content of the submitted application, at least one copy of all information submitted to the Department shall be kept by the applicant for reference.

## IV. RADIOACTIVE MATERIALS APPLICATION FORM RH-1

Two copies of the application Form RH-1 should be completed following the instructions provided with the form. One copy should be filed and one kept by the applicant. Since the space provided on the form is limited, additional sheets should be appended as necessary. Supplemental information should be labeled to identify the applicant and reference the items for which information is being given. The following comments deal with the indicated items of the Form RH-1.

Item 1 - Applicant and Locations of Use: The applicant or other legal entity (corporation, etc.) should be specified by name and mailing address in Item 1(a). Individuals should be designated as the applicant only if they are acting in a private capacity and the use of radioactive material is not connected with their employment with a corporation or other legal entity.

The actual sites of use should be given in 1(b). Permanent facilities such as field office storage areas for the gauges or devices should be identified in 1(b) by street address, city, and state. In addition, field locations of use should be specified as "temporary job sites of applicant," and list state throughout which the devices will be used.

Attach additional properly keyed sheets if more space is needed.

The Nuclear Regulatory Commission has regulatory authority with respect to byproduct material in some states other than Kansas (eg. Missouri, Oklahoma). Gauge operators who wish to operate in an NRC state should contact the appropriate regional office within the NRC for licensing requirements and information concerning reciprocity for Kansas licensees.

Items 2 and 3: Self Explanatory.

Item 4 - Individual User(s): Each person who will use radioactive material should be named and his qualifications provided. An authorized individual user shall be present and directly supervise use at any temporary job site. User qualifications should include, as a minimum, the completion of a device manufacturer's training course or program.

If the applicant desires to provide in-house training for his own personnel, a description of the training must be provided. Included in the description of in-house training should be:

(a) The name(s), training and experience of the individual(s) providing formal training.

(b) An outline of the formal training and on-the-job training to be provided, including the duration of the training.

(c) The means of determining when the trainee has satisfactorily completed the training and is capable of carrying out the radiation safety responsibilities required by the license.

Item 5 - Radiation Protection Officer: A radiation protection officer should be named in Item 5. A statement should be included with the application outlining the named individual's duties and responsibilities. The radiation protection officer is expected to coordinate the safe use of the nuclear gauging devices and ensure compliance with the requirements of the Kansas Radiation Protection Regulations, and applicable U.S. Department of Transportation regulations. Appropriate, documented training of the radiation safety officer should include:

(a) To assure that radioactive materials possessed under the license conform to the materials listed on the license.

(b) To assure that use of the devices, particularly in the field, is only by individuals authorized by the license.

(c) To assure that all users wear personnel monitoring equipment, such as film badges or thermoluminescence dosimeters (TLD), when required.

(d) To assure that gauges are properly secured against unauthorized removal at all times when they are not in use.

(e) To serve as a point of contact and give assistance in case of emergency (gauge damage in the field, fire, theft, etc.) to assure that proper authorities, (for example the Radiation Control Program and local police) are notified promptly in case of accident or damage to gauges.

(f) To assure that the terms and conditions of the license, such as periodic leak tests, are met and that the required records, such as personnel exposure records, leak test records, etc., are periodically reviewed for compliance with Kansas Radiation Protection Regulations, requirements, and license conditions.

Item 6 - Radioactive Materials: Each sealed source to be used in a given gauge or device should be specified by isotope (for example, cesium-137, americium-241, etc.), manufacturer, Sealed Source and Device Catalog number, model number of each source, and activity in either millicuries or microcuries. The total number of each of the listed model number sources should be specified.

Item 7 - Uses: The manufacturer's name and model number of each gauge or device utilizing the sources listed in Item 6 must be specified and keyed to the listed sources. In addition, the purpose for which the gauges or devices will be used must be stated, for example. "Moisture-density gauges to be used for measuring moisture and surface density of construction materials."

Items 8 and 9 - Training and Experience of Personnel: The documented training and/or experience of

each person who will directly supervise the use of the gauges or devices or who will have radiological safety responsibilities should be submitted as indicated in Items 4 and 5 above. Copies of all training certificates should be included. The qualifications of users and radiation safety personnel should be commensurate with the proposed use.

Items 10 and 11 - Radiation Detection Instruments: Radiation detection instruments such as survey meters may not normally be required if the applicant plans only to use the gauges and devices for their intended use and does not plan to perform maintenance on the gauges and/or devices involving access to the sources and source holders. In addition, dose limits to the general public must be considered. K.A.R. 28-35-214a states that "the total effective dose equivalent to individual members of the public from the licensed or registered operation does not exceed 1 mSv (0.1 rem) in a year" and "the dose in any unrestricted area from external sources does not exceed 0.02 mSv (0.002 rem) in any one hour." If survey meters are not used, justification must be provided in the application.

If necessary, the survey instrument(s) that will be available at each site should be specified. At least one low range beta-gamma (0-20 or 0-50 mR/hr) survey meter should be available. In addition, survey meter calibration provisions should be described. If the applicant intends to contract out the calibration or instruments, the name, address and license number of the calibration firm should be specified together with the frequency of the calibration. The applicant should contact the firm that will perform the calibrations to determine if information concerning calibration procedures has been filed with the Department. If information has not been filed, information concerning calibration procedures should be obtained and submitted.

If the applicant intends to perform the survey instrument calibrations, state the frequency and describe the methods and procedures for performing the calibrations.

An adequate calibration of survey instruments cannot be performed with built-in check sources. Electronic calibrations that do not involve a source of radiation are also not adequate to determine the proper functioning and response of all components of an instrument.

Daily or other frequent checks of survey instrument function should be supplemented periodically with a two-point calibration on each scale of each instrument with the 2 points separated by at least 50 percent of the maximum scale divisions. Survey instruments should also be calibrated following repair and after potential damage (dropping of meter, etc.). A survey instrument may be considered properly calibrated when the instrument readings are within $\pm$ 10 percent of the calculated or known values for the points checked. Readings within $\pm$ 20 percent are considered acceptable if a calibration chart or graph is prepared and attached to the instrument.

The description of applicant's calibration procedures should include, as a minimum:

(a) The manufacturer and model number of each radiation source to be used,

(b) The nuclide and quantity of radioactive material contained in the source,

(c) The accuracy of the source(s). The traceability of the source to a primary standard (NBS traceability) should be provided,

(d) The step-by-step procedures for calibration, including associated radiation safety procedures, and

(e) The name(s) and pertinent experience of person(s) who will perform the calibrations.

Item 12 - Personnel Monitoring: Normally, personnel using portable moisture-density gauges are required to wear personnel monitoring devices such as film badges or thermoluminescence dosimeters (TLD). Users of devices exhibiting low radiation levels at the surface of the device, such as X-ray fluorescence analyzers, etc., are not usually required to wear personnel monitoring devices, if justification is supplied. If personnel monitoring devices will be utilized, specify the type of device, that is, film badges or thermoluminescence dosimeters (TLD), the frequency of exchange and the name and address of the supplier of the film badge or TLD service. This supplier must be NVLAP (National Verification Laboratory Verification Program).

Item 13 - Facilities and Equipment: The applicant should provide a description of the means of storage of gauges or devices at his address, regional office, etc., when gauges and devices are not in actual use by the individuals listed in the application. Gauges must be stored in such a manner as to ensure against unauthorized removal of unauthorized use as required by 28-35-222a of the KRPR's. A simple annotated sketch or sketches of the storage area(s), closet(s), etc., showing relationships to actively occupied areas should be submitted.

Item 14 - Radiation Protection Program: Procedures should be established to ensure compliance with the provisions of Part 10, "Notices, Instructions and Reports to Workers, Inspections," and Part 4 "Standards for Protection Against Radiation", of the KRPR's. The applicant should submit a copy of his written radiation safety and emergency procedures. The procedures should be in the form of written instructions to users and should cover the following items:

(a) Safety measures to be used in transporting the devices in the applicants' vehicle (for example, fully secured within transportation vehicle and away from the passenger compartment). Transportation activities must be carried out in accordance with the requirements of 28-35-195a and 28-35-196a in the KRPR's and the U.S. Department of Transportation regulations.

(b) Means of preventing unauthorized access, use or removal of the gauges from temporary job sites. Instructions should state that individual users are never to leave gauges unattended or unsecured. Means of preventing unauthorized use or removal of gauges from the designated place(s) of storage at permanent locations and at temporary job sites.

(c) The procedure for conducting a physical inventory must be provided. This inventory should include the quantities and kinds of radioactive materials, location of sources, and the date of the inventory.

(d) Emergency procedures to be followed in case of accidents involving damage or loss of the gauges or devices, including names and telephone numbers of the individual(s) with the applicant's organization who should be notified and who would, in turn, notify the local police, Radiation Control Program and the NRC (if applicable). The expected time frame for decommissioning should be included.

(e) Specific instructions to the users informing them that any maintenance on the gauges involving dismantling, removal of source holder(s) etc., must not be performed by the user and must only be performed by the manufacturer of the device, unless the applicant has specifically requested authority for performing maintenance in the application.

If the applicant wishes to be authorized to perform maintenance and repair on gauges and devices involving access to the source holders, and/or dismantling of the shielding or shutter devices, specific information on the step-by-step procedures to be followed including radiation safety precautions must

be supplied. In addition, the names of personnel and the specific pertinent training of the personnel who will be performing such maintenance and repair must be given.

In addition to the items listed above concerning the applicant's radiation safety program, the applicant must also describe the means of performing the required 6 month leak testing of the sealed sources requested in the application. If the applicant plans to use a leak test kit, the name of the manufacturer or service must be supplied. If the applicant desires to perform his own leak tests and not use a leak test kit, the following information should be submitted.

(a) The name(s) and qualifications of personnel who will perform the leak test.

(b) The safety procedures to be followed during the testing to minimize exposure to personnel.

(c) The test procedures and materials to be used.

(d) The type and the manufacturer's name and model number of the instrument to be used to assay the test sample. The test must be capable of detecting the presence of 0.005 microcurie of contamination.

Item 15 - Waste Disposal: In the event the sealed sources will no longer be needed, the applicant should specify the means of disposal. Sealed sources containing radioactive material may be returned to the manufacturer, transferred to another licensee authorized to possess the specific quantity and form being transferred, or transferred to a licensed waste disposal firm.

## V. AMENDMENT AND RENEWAL OF LICENSES

Applications for amendment of existing licenses should be filed in the same manner as initial applications or may be filed in letter form. The request should clearly identify the license which is to be amended by license number. The exact nature of the requested changes should be specified and additional supporting information, as necessary, should be provided.

Licenses are normally issued for a period of two (2) years. If an application for license renewal is filed thirty (30) days or more before license expiration, the existing license remains in effect until the new application has been finally acted upon by the Department.

Renewal applications should contain complete and up-to-date information concerning the applicant's current program. References to previously submitted documents should be clear and specific and specify the document by date and indicate pertinent information by page and paragraph.